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HOSPITAL FOOD SERVICES

Issued by the Research and Planning Unit
of the Department of Health
Wellington, New Zealand

1969

DEPARTMENT OF HEALTH

HOSPITAL FOOD SERVICES

Two exploratory studies: A centralised tray system and the use of a selective menu in a decentralised service.

by

THE RESEARCH AND PLANNING UNIT

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The opinions expressed in this report
are those of the authors and do not
necessarily represent the views of
the Department of Health

FOREWORD

This report, the first in the series relating to a specific hospital service, is concerned with two exploratory studies carried out by the Research and Planning Unit with the help of members of the Nutrition Section.

As hospital costs increase, the continuing aim is to improve efficiency and reduce waste, balanced by the need to preserve the standard of patient care. The results of these studies show that this dual aim can be achieved in the area of hospital food services.

D.P. Kennedy
Director-General of Health

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INTRODUCTION

This report is concerned with studies covering the despatch of food from the main kitchen to the wards of a New Zealand public hospital. Study 1 deals with the experimental installation of a centralised dinner service and pays particular attention to the evaluation of two types of transport equipment. Study 2 deals with the feasibility of introducing a selective menu into a decentralised service for all meals of the day. It was carried out as a result of some of the findings in the first study.

STUDY 1

A study of centralised food services in England showed that it could be both efficient and acceptable. (1) Ideally such a service applies methods of quantity control to the serving of food items ordered by patients from a selective menu. Individual trays are made up in a central serving area, and various methods have been tried to keep the food hot during transit to the wards. (2)

1. PURPOSE

(a) To assess the efficiency and quality of a centralised tray system of dinner meals using a selective menu and methods of quantity control, and to evaluate two types of transport equipment designed to carry centrally served meals.

(b) To assess the efficiency and quality of a decentralised system of dinner meals using a selective menu but without using methods of quantity control.

2. THE STUDY

The study covers a period from 24 February to 23 March 1967, when a modified hot pellet system was installed in the main kitchen of a 300 bed general hospital for the purpose of the study. The patients in two surgical wards received a selective menu and either centrally served dinner meals or meals served in the ward. The two wards, together with a Control ward were chosen because they were equidistant from the main kitchen, and contained both male and female patients.

2.1 BASIC DATA

Four sources of data were used:-

(a) The menus, completed by the patients.

(b) A questionnaire, completed by the patients.

(c) The observed weight of cooked bulk food, and the weight of the collective plate waste from each ward.

(d) A rated assessment of the quality of service by Ward Observers.

2.11 The Menu

The selective menu for each day was designed to fit into the existing menu pattern of the hospital so that patients on modified diets could have some choice of food. A small, average or large portion was offered for each food item, and the patients were required to tick the amount of each item they wanted. A sample menu appears in Figure 1.

The menus were checked daily by the nursing staff who were also available to help patients fill them in.

2.12 The Questionnaire

This was printed on the reverse side of each menu card. Questions related to the amount of food received and the temperature, flavour and appearance of the meals. One question dealt with prevailing appetites before the meal. Patients were asked to complete the questionnaire immediately after each meal. A sample is shown in Figure 2.

2.2 TYPES OF SERVICE

2.21 Control Ward

This followed the usual practise in the hospital. Bulk food requirements were assessed from the numbers of normal, light or modified diets ordered by the ward sister and the ward trolley was filled accordingly by the kitchen staff. For the purpose of the study, the food placed in the ward trolley was removed and weighed before being despatched to the ward. Meals were served in the ward from the bulk food trolley and the patients were issued with a modified questionnaire.

2.22 Menu and Ward Service

A selective menu was offered to the patients and the number of items ordered was tallied for bulk food assessment. These numbers were given to the kitchen staff and the ward trolley was filled in the usual manner. Food was weighed before despatch and the meals were served in the ward by the nursing staff who made their own assessment of portion sizes.

2.23 Centralised Services

The bulk food required, calculated by weight from selective menus completed by patients, was weighed into containers prior to serving. Staff training in portion serving was given to standardise portion sizes, and food items were test weighed before the tray service began. Two transport systems were used:-

(a) Hot Pellet System

Unheated tray carriers conveyed set trays with the dinner meals kept hot by heated metal pellets in a plate base.

(b) Composite System

The unheated tray carriers carried set trays and cold dishes. A heated trolley carried plates of hot food which were placed on the appropriate trays in the ward.

2.3 TRANSPORT EQUIPMENT

2.31 Tray Carriers

These were designed and made as experimental equipment for the study. Each carrier holds 16 fully set trays ($18\frac{1}{2}$" x $14\frac{1}{4}$") supported on tray slides and made accessible by sliding doors on both sides of the trolley. Trolley framing is of aluminium and all sheathing and door panels of aluminium plymax. Removable end panels give easy access for cleaning, and standard bumper rail, wheels and handles are fitted. A drawing is shown in Figure 3.

2.32 Heated Trolley

This was used for the Composite system only, and was designed and made as experimental equipment for the study. Made of stainless steel, it is insulated, and heated by thermostatically controlled electrical elements. The trolley carries 30 covered dinner plates in drawers mounted on telescopic runners. There are four bulk-liquid containers inset into the top, and standard bumper rails, handles and wheels are fitted. A drawing is shown in Figure 3.

3. EFFICIENCY OF SERVICE.

The efficiency of the three types of food service given is considered in relation to the effect of quantity control, the satisfaction of patients with the amount of food they received, and their prevailing appetites before each meal.

3.1 QUANTITY CONTROL

The relevant figures and tables are:-

(a) Figure 4. 'Analysis of the average amounts of food issued per patient per meal.'

(b) Table 1. 'Differences between sexes in the amount of food served, eaten and wasted per meal.'

(c) Figure 5. 'Food wastage: The amount of food cooked but not eaten expressed as a percentage of the amount eaten.'

3.2 PORTION CONTROL

See Figure 6. 'Patient satisfaction with the portions they received.'

3.3 QUESTIONNAIRE RESPONSES

The relevant tables are:-

(a) Table 2. 'Responses regarding the amount of food received.'

(b) Table 3. 'The percentage of respondents in different service groups with varying appetites.'

4. QUALITY OF SERVICE

This is considered in relation to the Ward Observer assessments of one tray picked at random each day, and the questionnaire responses about the completeness of the order, the appearance and the flavour of the meals.

4.1 WARD OBSERVER ASSESSMENTS

The relevant figures and tables are:-

(a) Figure 7. 'A sample rating form used by the Ward Observers.'

(b) Table 4. 'Rated scores for the assessment of the quality of service.'

The data in table 4 show only those items pertinent to each tray assessed.

4.2 QUESTIONNAIRE RESPONSES

See Table 5. 'Order completeness, appearance and flavour of meals.'

5. TRANSPORT EQUIPMENT.

The duration of transport times and serving times are considered in this section. The temperature of the first and last meals served, and the questionnaire responses about the temperature of meals are also considered. Spillage ratings have been extracted from the Ward Observer assessments.

The relevant figures and tables are:-

5.1 TIME

(a) Figure 8. 'The average transport and ward waiting times, and the number of trolleys used.'

(b) Figure 9. 'The average duration of ward service from the first to the last meal served. Adjusted to an average ward of 23.3 patients.'

The ward waiting time in Figure 8 refers to the elapsed time between the arrival of a trolley or trolleys in the ward and the service of the first meal to a patient.

5.2 TEMPERATURE

(a) Table 6. 'Food temperatures: Means and Standard Deviations.'

(b) Table 7. 'The percentage of respondents who rated the meal 'hot enough' and 'not hot enough'.

5.3 SPILLAGE

Figure 10. 'The percentage of dinner meals free from spilling.'

6. DISCUSSION

6.1 BASIC DATA

6.11 The Menu

The menu design resembles that of a menu in use at the Royal Infirmary, Newcastle-upon-Tyne, in that it offers the patients a choice of portion size for each item selected. (3)

Layout of the menu proved satisfactory to the servers but it was noticed that those cards which had squares blocked in were more easily seen than those which were ticked. Care should be taken in future studies to ensure that all menus are clearly marked. The coloured stickers used for coding modified diets were clearly visible to all servers.

6.12 Other Forms

The charts used to record the weight of bulk cooked food and plate waste proved satisfactory, but the rapid clearance of trolleys from the kitchen meant that on two days the Control ward food could not be weighed.

Ward Observer charts could be improved for future studies. A space for noting the number of nurses required to serve the meals would be an advantage. The temperature data is incomplete because only two transistorised thermometers were available during the first few days of the study.

Layout of the questionnaire, limited because of the size of the menu, resulted in some patients ticking only the first item of the 'amount received' question. A total of 1376 questionnaires were issued, and 1162 were returned with one or more questions answered (84%). All questions carried a response rate of 73% or more.

6.2 EFFICIENCY OF SERVICE

6.21 Quantity Control

In a study of this nature it would be impossible to weigh each patients' meal and plate waste without causing disruption to the ward routine. Statistical treatment of the data is therefore limited to obtaining daily average amounts from each ward and applying tests of significance to these.

The application of methods of quantity control to the centrally served meals resulted in less food being issued for the centralised than for the two decentralised services. A comparison of the amounts of food eaten reveals that the centrally served patients ate less than their Control ward counterparts, but the differences between other groups are not significant at the 5% level of confidence. A comparison of the amounts of plate waste from each ward shows that those patients who used a selective menu for meals served either centrally or in the ward, wasted less than the patients in the Control ward.

6.22 Portion Control

A centralised food service does not give the patients an opportunity to have second helpings of food, and the size of portions becomes important if patients are to be satisfied with the amount of food they receive. In this study the centrally served patients ate less than those in the Control ward, but an analysis of the portion sizes ordered and the questionnaire responses shows that the majority of the centrally served patients were satisfied with the amount of food they received.

6.23 Questionnaire Responses

Differences in the response rates for items marked 'too much received' and 'enough received' are not significant at the 5% level of confidence. The number of items marked 'not enough' are significantly less from the Menu and Ward served patients than from either the centrally served or Control ward patients. This cannot be entirely due to the availability of second helpings since the Control ward patients also had the opportunity to receive extra food.

Difference in response rates for the question about appetites are not significant at the 5% level of confidence.

6.3 QUALITY OF SERVICE

6.31 Ward Observer Assessments

Most of the tray settings were complete, and differences in scores between the various types of service are not significant. The over-all scores for the Menu and Ward service are significantly lower for the dinner plate assessment, and significantly higher for the sweet plate assessment when compared with the other types of service at the 5% level of confidence.

6.32 Questionnaire Responses

These show that 2.5% of the centrally served patients did not receive all the items they ordered in spite of the careful checking of meals before despatch. This implies that adequate training and supervision of serving staff will be essential if centralised services are planned.

More patients in the Control ward rated the appearance and flavour of their meals as 'poor' when compared with those respondents who had used a selective menu. The difference is greatest between the Control and Menu and Ward served patients who rated their meals as being of poor flavour. During the study all food was cooked in bulk, and the flavour should not have been affected during the filling and transport of bulk food trolleys. This finding may be due to the fact that patients tend to express their satisfaction or dissatisfaction with hospital conditions when making comments about the food they receive. (4)

6.4 TRANSPORT EQUIPMENT

6.41 Time

Variations in the transit times of food trolleys between the main kitchen and the wards are not regarded as sufficient to affect the temperature of the meals. Ward waiting times are increased for the decentralised services, probably because this includes the time taken to serve the first meal as well as the time taken to prepare the trolley and equipment.

6.42 Temperature

None of the equipment used in this study maintained food temperatures at the recommended level of 140^{o}F, (5)(6). Temperature variations occurred between:-

(a) Individual food items served for each meal.

(b) The same food items served for the first and last meal.

(c) The same food items served under the different types of meal systems.

Food temperatures for the first meals served centrally are lower than those of the decentralised services. This may be partly due to the fact that, for the study, small quantities of bulk food had to be placed into large containers prior to service, and the subsequent heat loss would be more rapid than that lost from the large amounts of food placed in the bulk food trolleys for service in the wards.

A comparison between the food temperatures of meals transported by the two types of equipment for the Centralised services shows no significant difference for the first meals served. For the last meal served however, the difference is significant, implying that the hot pellet system retained heat more effectively than the Composite trolley. This finding is not confirmed by other workers who discovered a hot pellet heat loss of 10^{o}F after ten minutes.(7)

The lower temperatures of the Composite system are reflected in the questionnaire responses about the temperature of meals. A significantly lower proportion of patients receiving this service rated their meals as 'hot enough' when compared with the responses from patients receiving the other types of meal service.

6.43 Spillage

The frequency of food spilling from dinner plates is assessed from figures extracted

from the Ward Observer ratings. Of the two centralised transport systems, the Composite trolley allowed more spilling than the Hot Pellet system, but the difference is not significant at the 5% level of confidence. Comparisons between the two centralised and the two decentralised services show that less spillage occurred with meals served centrally than with meals served in the wards.

6.44 Comment

The unheated tray carriers proved satisfactory for ease of movement and operation, but the doors occasionally slid open during transit. No food was spilt from the dinner plates, and the infrequent spilling of sweets is attributed to the use of standard hospital dishes instead of the specially designed ones. Fixed panels could replace the removable end panels as cleaning access from the sides of the trolleys proved adequate. The trolleys were quiet in movement and provided a quick and easy method of meal service in the wards.

The heated trolley of the Composite system was difficult to manoeuvre because of its weight, its length, and the type of wheel assembly used. We find it harder to push than the standard bulk food trolleys. Distribution of heat is uneven, with some drawers only registering 105°F after being heated for an hour. In spite of its telescopic runners, the drawers are difficult to open and close. These faults of design and manufacture prejudiced the operation of the Composite system of meal service, but if these are eliminated, the trolley could provide a useful means of transporting hot meals.

6.5 GENERAL COMMENT

This study is primarily concerned with the despatch of food from a hospital kitchen to the wards. The methods of food preparation and cooking used prior to despatch were not investigated, but we note with interest the increasing use of pre-packed frozen foods both in this country (8) and abroad (9). It may well be that a centralised food service used in conjunction with these 'convenience foods' would provide an ideal food service in New Zealand public hospitals, and a full scale investigation into all aspects of such a service is advised. In the meantime, the results of this study suggest that the introduction of a selective menu for all meals served in the wards, and the application of quantity control methods to the serving of those meals, could be a convenient and efficient way of phasing-in centralised services.

7. CONCLUSIONS.

(1) The quantity control methods used in the preparation and serving of centrally supplied dinner meals provide an economical service without affecting the satisfaction of the patients.

(2) The patients using a selective menu for meals served either centrally or in the wards, tended to show greater satisfaction with the amount and flavour of the meals they received than did those patients who did not use a selective menu.

(3) Centrally served dinner meals could be distributed to patients without undue impairment of the appearance of food or tray, and without undue loss of heat.

(4) The Hot Pellet system of transporting meals was more effective than the trolley used for the Composite service.

8. RECOMMENDATIONS

Further investigation is recommended into the use of a selective menu for all meals of the day where methods of quantity control are applied to meals served in the wards.

STUDY 2

The previous study showed that those patients using a selective menu for the dinner meal were more satisfied with their meals and left less plate waste than those patients who did not use a menu. This study deals with the experimental introduction of a selective menu and methods of quantity control into an existing decentralised service for all meals of the day. It was carried out in the same hospital as Study 1.

1. PURPOSE

To assess whether methods of quantity control used with a selective menu would provide an economical and practical method of serving meals in a decentralised food service.

2. THE STUDY

The study covers a period from 26 June to 14 July, 1967, but because of staffing difficulties this did not include weekends. A selective menu was introduced into an acute medical ward containing 45 patients of both sexes. A similar ward in the 300 bed general hospital served as a Control Ward.

2.1 BASIC DATA

Three sources of data were used:-

(a) The menus, completed by the Study Ward patients.

(b) A questionnaire, issued to all patients.

(c) The observed weight of cooked food issued, and of the collective plate waste from each ward.

2.11 The Menu

The basic design and the use of the menu followed that of the previous study. A sample is shown in Figure 11.

2.12 The Questionnaire

The questions asked related to the amount of food, the prevailing appetite before each meal, and, for the Study Ward, to the completeness of the order. As in the previous study, the questions were printed on the reverse side of each menu.

2.2 TYPES OF SERVICE

2.21 Control Ward

This was the same as for Study 1.

2.22 Study Ward

The bulk food required, calculated by weight from the completed menus, was weighed into the containers of the ward trolley before each meal. A serving allowance, which differed for each food item, but averaged 20% of the amount ordered, was added to the bulk food requirements. Meals were served in the ward, the nursing staff having been trained in portion serving before the study began. A serving guide was sent with each meal, and a sample guide is shown in Figure 13. A copy of the portion sizes used for all meals is shown in Figure 14. For the

dinner meals the portion sizes were the same as those used in the previous study.

3. EFFICIENCY OF SERVICE.

This is considered in relation to the effect of quantity control, the efficiency of portion control, the satisfaction of patients with the amount of food they received, and a theoretical estimation of monetary savings.

3.1 QUANTITY CONTROL

The relevant figures are:-

(a) Figure 15. 'Analysis of the average amounts of food issued per patient per meal.'

(b) Figure 16. 'Food wastage: The amount of food cooked but not eaten as a percentage of the amount eaten.'

3.2 PORTION CONTROL

See Table 8. 'Serving Analysis: Total Amounts.'

See Table 9. 'Serving Analysis: Amount per patient per meal.'

3.3 QUESTIONNAIRE RESPONSES

See Table 10. 'The number of menus and completed questionnaires returned.'

3.4 SAVINGS

See Table 11. 'Theoretical savings based on the results of this study.'

4. DISCUSSION

4.1 BASIC DATA

4.11 The Menu

Menu tallying for the Study Ward was done manually and took about an hour each day. For a selective menu service in a large hospital automatic processing would be necessary. Equipment is available ranging from simple adding machines to computer processors. An electronic scoreboard device with automatic tallying for example, appears to be simple to use and is reported to cut clerical costs significantly. (10)

4.12 The Questionnaire

The low response rate, which is considered too low to be representative, is attributed to a number of factors. These factors can be divided into two groups, - those which could not easily be controlled, and those which could, and should have been controlled.

(a) Non-controllable factors

These include:-

The Age of Patients Ages were recorded for 78 of the 84 Study ward patients. Nineteen of the 33 female patients were aged 65 years or more; 13 of these were over 80, and four were over 90 years of age. Less than half (20) of the 45 male patients were over 65 years. Of these, only four were aged between 80-89 years, and one was aged over 90 years. There is no reason to believe that the Control ward patients were

significantly younger.

Ward Work-load Patient dependency loading was not recorded but it was apparent that the load was heavy in both wards. Approximately ten deaths per week were recorded throughout the study period.

(b) Controllable Factors

These include:-

Communications Ward sisters refused offers of help to get the questionnaires completed. It is possible that they did not fully understand the reasons for the questionnaire or the way it linked up with the observed weights of bulk food. It is difficult in this type of study to achieve a balance between fostering a 'research-minded' attitude, and obtaining unbiassed results from those who know or suspect that their actions could alter the outcome.

Organisation of data collection It is clear that in this study the collection of questionnaire data should have been carried out by members of the study team. The difficulty was not anticipated, as it had not been encountered in the previous study. If further studies are to be made, extra members will be needed for the study team to cover such contingencies.

4.13 Bulk Food Observations

The data for each day covers the dinner, tea and breakfast meals of the following morning. Breakfast data for the last two Saturdays of the study period was not obtained because of staffing difficulties, and not all of the plate waste was collected. Of the 45 meals covered by the study, complete data is available for 38 Study ward meals, and 40 Control ward meals.

4.2 QUANTITY CONTROL

The statistical treatment of data is the same as that of the previous study. A comparison of those dinner meals served in each study with methods of quantity control reveals a striking similarity between the amounts of food issued, returned, eaten and wasted. Further comparison shows that in the surgical wards the Control ward patients ate more than the centrally served patients, but in the medical wards this was reversed, with the Study ward patients eating more than those in the Control ward. The quantity control methods differed slightly between the two studies in that the medical ward patients could have been offered second helpings of any food remaining unserved.

In contrast to the previous study findings, no significant reduction in the amount of food issued to the Study ward was achieved. The reasons for this are considered in the next section. A reduction of 34% in trolley and plate waste however, compares favourably with the 20 - 50% reductions found in other studies. (11) (12) (13). The use of a selective menu resulted in less plate waste in both this and the previous study.

4.21 Serving Analysis

4.211 Amounts ordered, issued and served

The amount of food ordered by the Study Ward patients, together with the serving allowances added, make up the calculated amount issued to the ward. A comparison between the

calculated issue and the amount actually issued and served shows the following:-

(a) The amount served per patient per day was slightly less than the calculated amount issued.

(b) The more expensive food items, meat, vegetables and fruit, were adequately covered by the calculated issue.

(c) Extra food, averaging $7\frac{1}{2}$ ozs per patient was sent from the kitchen each day in addition to the calculated amount.

(d) 72% of this extra food was for dinner sweets, tea savouries and breakfast foods, the only food groups where the amount served exceeded the calculated amount. The issue of extra food for these groups was consistent throughout the study.

(e) More than half (56%) of the extra food issued for the dinner sweets, tea savouries and breakfast foods was returned unserved.

These findings imply that for some food groups the portion sizes were incorrectly served. Further experience and training should correct this error, but adjustment to portion sizes may be necessary.

4.212 Serving Allowances and Portion Sizes

The amounts added for serving allowances varied for the different foods but averaged 20% of the total amount ordered. This figure is possibly too high to be used as a yardstick, since the patients in the Study Ward ate less than they ordered for the dinner and tea meals. It would be unrealistic however, to omit serving allowances altogether, and further experimentation may be needed to find a satisfactory level.

For the breakfast meal the patients ate more than they had ordered, probably because the portion sizes were incorrectly served. Porridge was grossly over-served during the first two weeks of the study. Although it came within the calculated amount during the last week, the demand for extra cooked food increased, and this item became grossly over-served. Since the amount of plate waste did not differ significantly between the Study and Control wards, these findings imply that the portion sizes for breakfast foods need to be readjusted.

4.3 SAVINGS

The amount of food cooked but not eaten in both studies, (see figures 5 and 16) indicates that food wastage could be reduced. The savings estimated from the results of this study is based on the amount of food ordered by the Study Ward patients with a 20% allowance added (i.e. the calculated amount.) The difference between this amount and the amount issued to the Control Ward is regarded as food saved for costing purposes, since it need not have been prepared and cooked in the first instance. In some hospitals a certain proportion of the food returned unserved from the wards is salvaged and used for other meals, but on the other hand the 20% serving allowance can be regarded as a fairly generous one. The relative costs of each food item would need to be ascertained for a more accurate assessment of savings.

4.4 GENERAL COMMENT

The results of this study show that a selective menu used with methods of quantity control can

function economically in a decentralised meal service. The staffing and organisational difficulties encountered during the study indicate some of the practical problems involved in the introduction and maintenance of a selective menu service. Staff training and supervision is of paramount importance both in the kitchen and in the wards, and although the nursing staff found it quicker to serve from menus, the time saved was more than offset by the time spent in helping the patients to complete their menus.

5. CONCLUSIONS.

(1) As a first step towards the introduction of centralised services, the use of a selective menu with methods of quantity control could provide an economical and practical method of serving meals in a decentralised food service.

(2) Extra staff may be required to cover the additional work involved in menu tallying and in helping the patients to order their food. The application of Work Study techniques and the use of automatic equipment should reduce costs to a minimum.

(3) The type of selective menu service described could result in considerable monetary savings over a period of time.

6. RECOMMENDATIONS

We recommend:-

(1) That a selective menu, used with methods of quantity control, be introduced into hospitals.

(2) That a seminar be held to discuss:-

(a) The introduction of a selective menu and methods of quantity control into hospitals.

(b) The desirability of using a selective menu service as the first phase of introducing centralised food services.

(c) The need for further studies on the use of convenience foods for centralised services.

ACKNOWLEDGEMENTS

We are indebted to the hospital dietary department, the nursing staff and household staff for their help and co-operation during the study. Special mention is due to the kitchen staff, hospital electrician and ward staff, and also the patients, without whose help the studies could not have taken place.

FIGURES & TABLES

STUDY 1

FIGURE I

Bed / Ward

DINNER MENU

Diet / Check

Day _____ Date _____

Name _____

Please tick (✓) the amount of each food you choose.

● MEAT OR FISH — Small Average Large

● POTATO — Small Average Large

● VEGETABLE (Choose up to TWO) — Small Average Large

● SAUCE OR GARNISH (Tick if required)

● SWEET (Choose up to TWO) — Small Average Large

● CREAM (Tick if required)

MEAL SURVEY

Would you please help us by ticking (✓) the appropriate spaces below.

I received: all / not all the food I ordered.

I received: too much / enough / not enough — MEAT, FISH | POTATO | VEG. | SWEET

The hot food was: hot enough / not hot enough

The flavour of the meal was: good / average / poor

The appearance of the meal was: good / average / poor

Before the meal my appetite was: greater than usual / the same as usual / less than usual

Thank you for your help.

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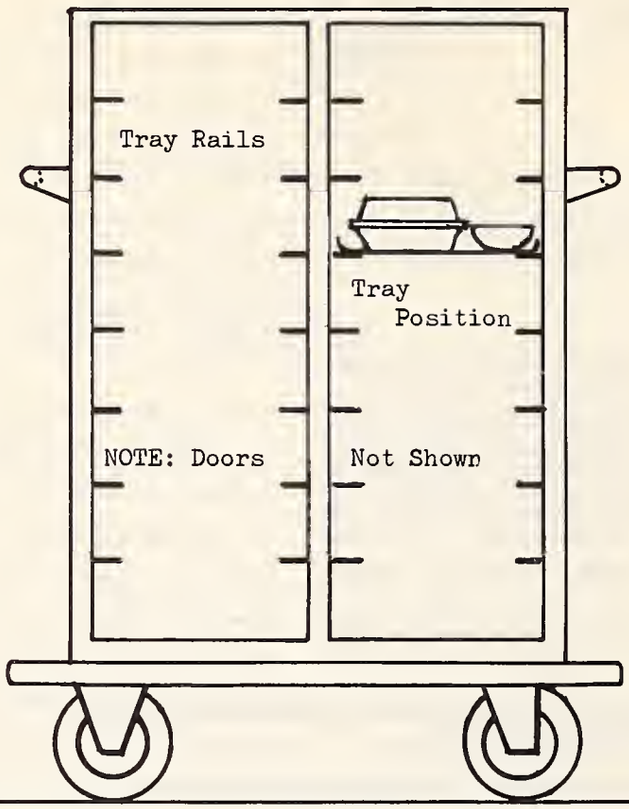
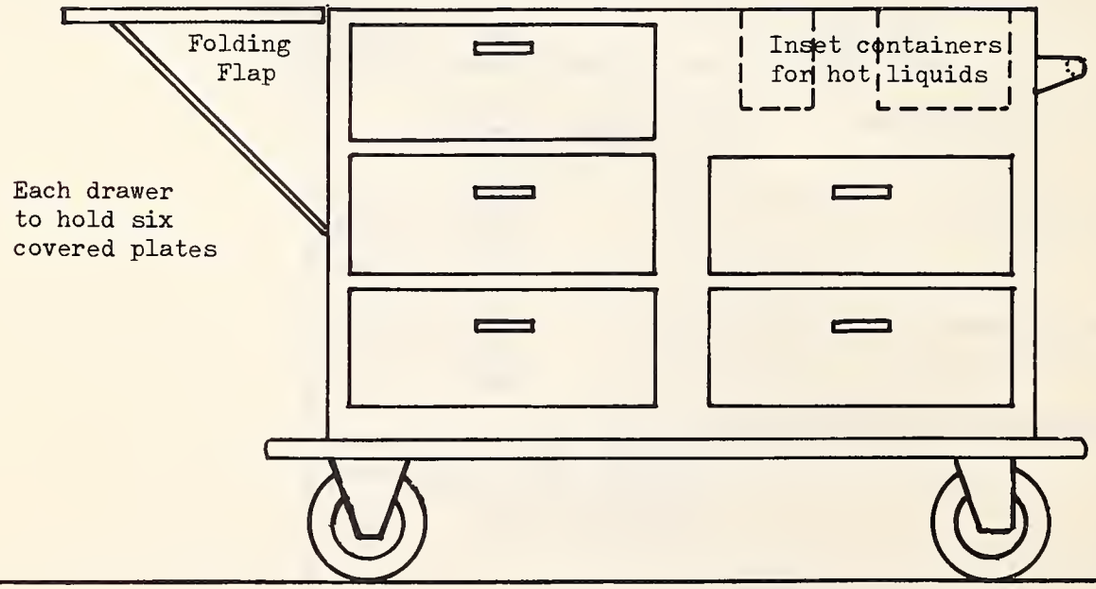
FIGURE 2

The questionnaire for the Control Ward omitted the first question.

FIGURE 3



DIAGRAMMATIC SIDE VIEW OF TRAY CARRIER



DIAGRAMMATIC SIDE VIEW OF TROLLEY
FOR COMPOSITE SERVICE

FIGURE 4

ANALYSIS OF THE AVERAGE AMOUNT OF FOOD ISSUED PER PATIENT PER MEAL

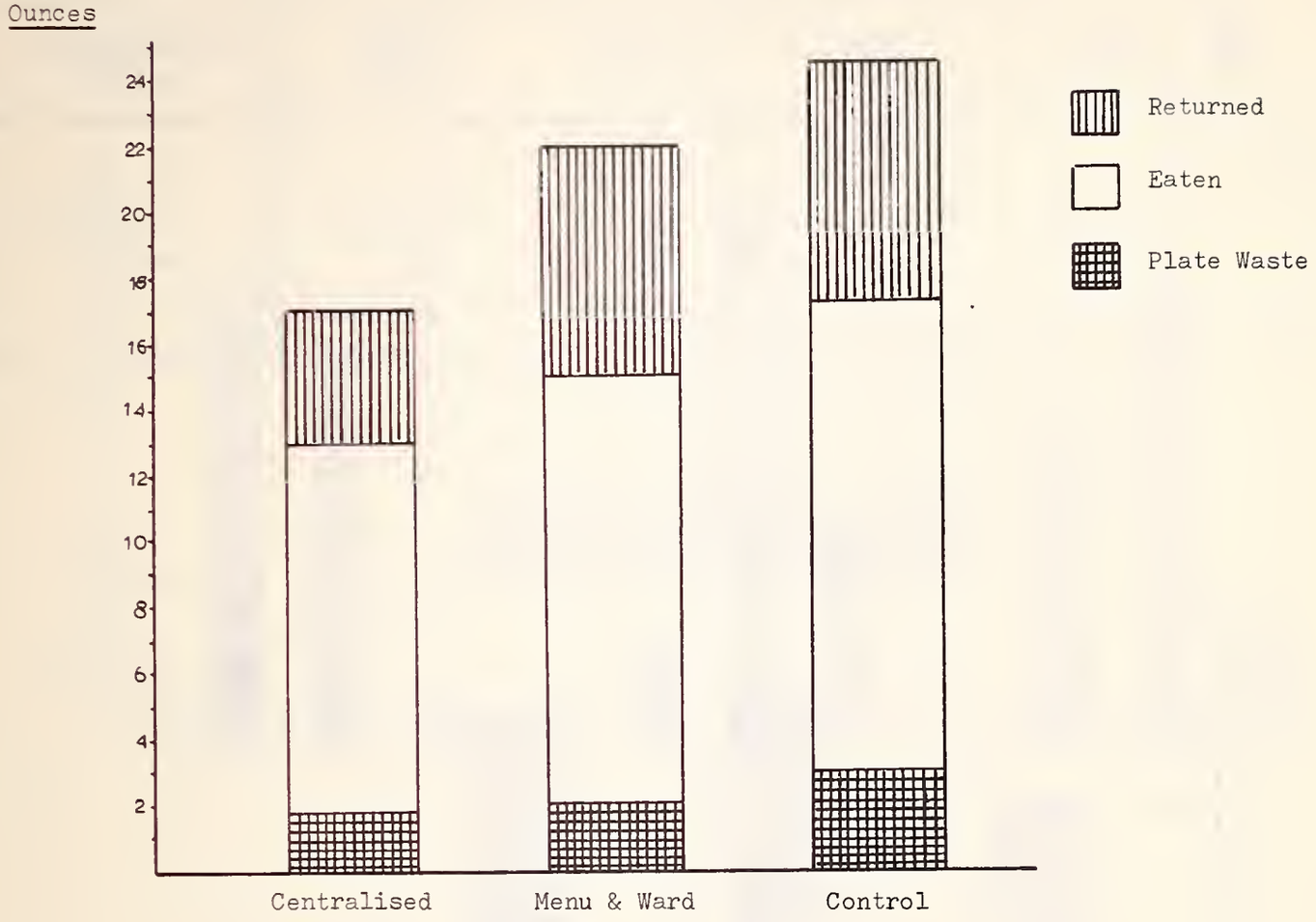


Figure 4. Tabulation and Significance (t-tests)

AMOUNT	CENT.	MENU & WARD	P.	CENT.	CONTROL	P.	MENU & WARD	CONTROL	P.
Issued	17.24	21.91	0.001	17.24	24.27	0.001	21.91	24.27	n.s.
Returned	4.23	7.15	0.01	4.23	7.12	0.01	7.15	7.12	n.s.
Eaten	11.19	12.65	n.s.	11.19	14.13	0.01	12.65	14.13	n.s.
Pl.Waste	1.82	2.11	n.s.	1.82	3.03	0.001	2.11	3.03	0.01

TABLE 1

DIFFERENCES BETWEEN SEXES IN THE AMOUNT OF FOOD SERVED, EATEN AND WASTED PER MEAL

	CENTRALISED		MENU & WARD		CONTROL
	MEN N-218	WOMEN N=262	MEN N=196	WOMEN N=262	MEN AND WOMEN N=390
Average amt:-					
Served	15.4 ozs	11.1 ozs	17.5 ozs	12.7 ozs	17.2 ozs
Eaten	13.7	9.1	15.8	10.3	14.2
Plate Waste	1.7	2.0	1.7	2.4	3.0

Figure 5

AMOUNT OF FOOD COOKED BUT NOT EATEN AS A PERCENTAGE OF THE AMOUNT EATEN

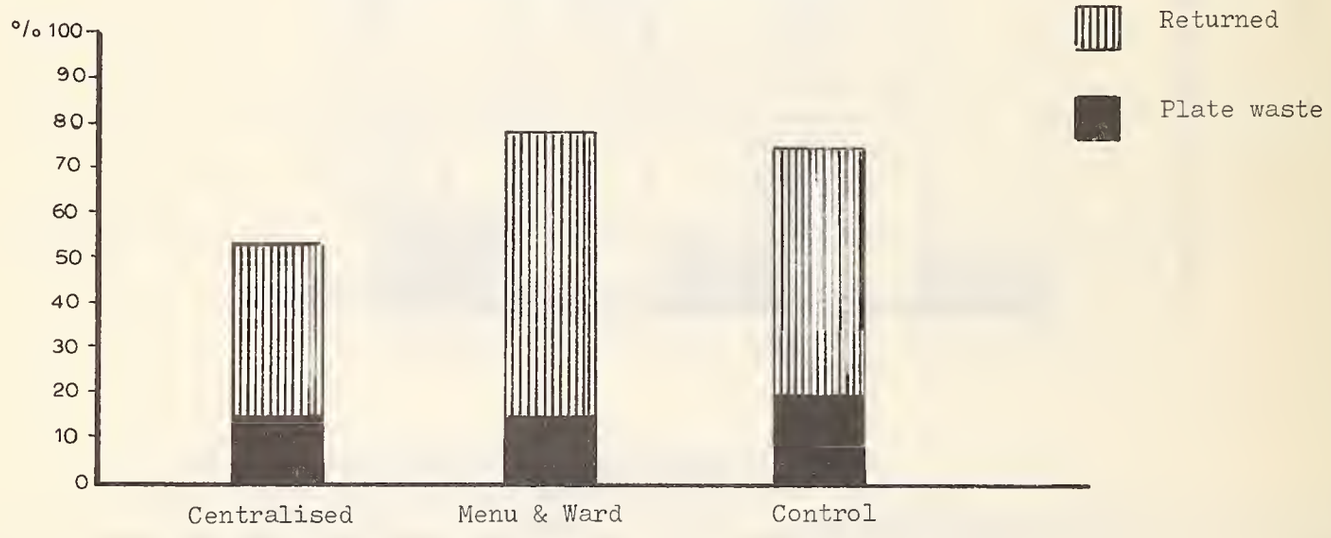


TABLE 2 - QUESTIONNAIRE RESPONSES REGARDING THE AMOUNT OF FOOD RECEIVED. (Combined food groups)

	CENTRALISED SERVICES		MENU & WARD SERVICE		CONTROL WARD	
	N	%	N	%	N	%
Too much	128	8.4%	123	8.9%	139	9.8%
Enough	1318	86.5%	1244	90.2%	1196	83.7%
* Not enough	78	5.1%	13	0.9%	93	6.5%

* t-test - Centralised and Menu & Ward. $p < 0.001$
Menu & Ward and Control. $p < 0.001$

Figure 6

PATIENT SATISFACTION WITH PORTION SIZES RECEIVED. (Centralised Services)
(Modified diets excluded)

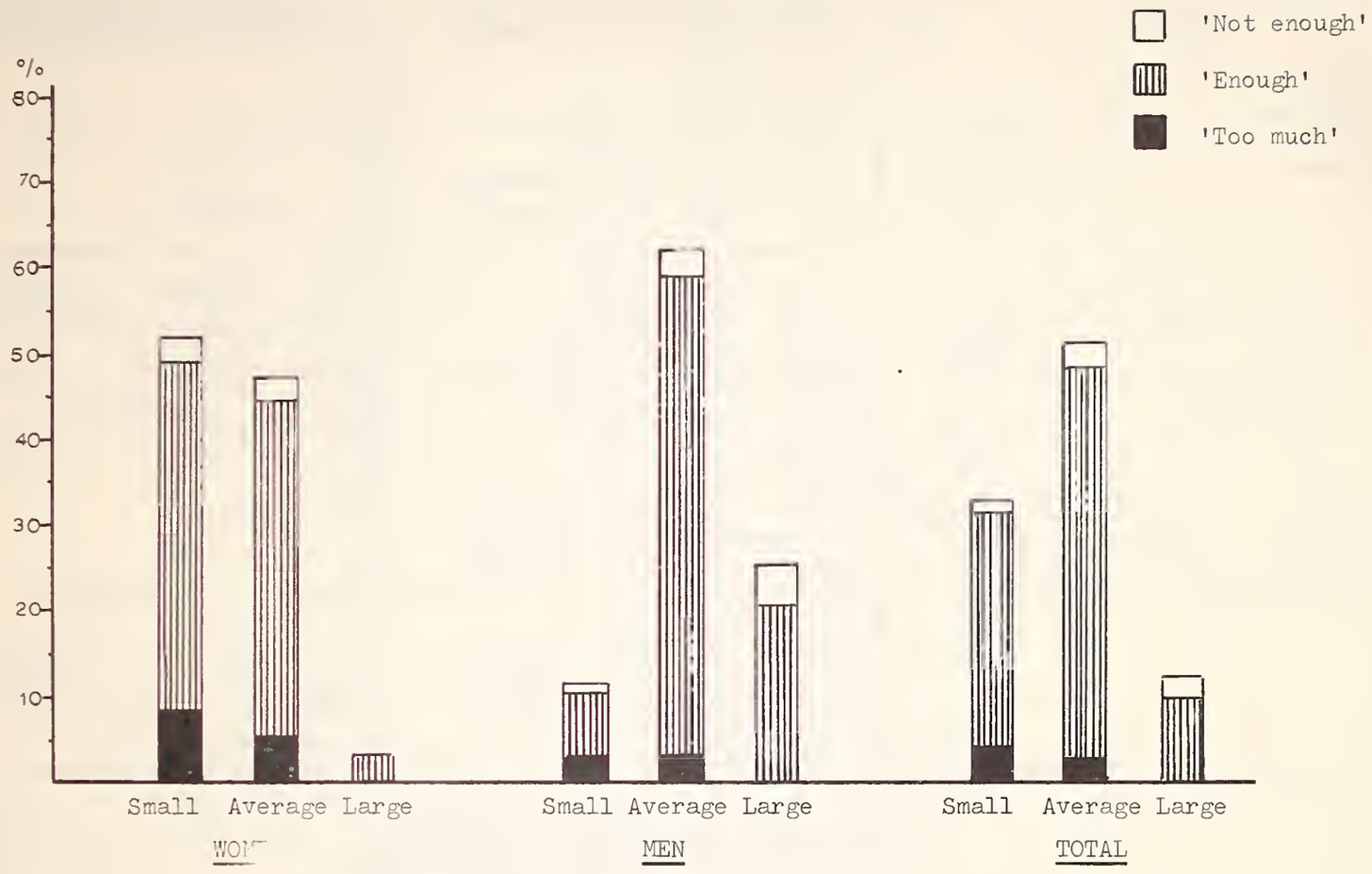


TABLE 3 THE PERCENTAGE OF RESPONDENTS IN DIFFERENT SERVICE GROUPS WITH VARYING APPETITES

APPETITE	TYPE OF SERVICE					
	CENTRALISED		MENU & WARD		CONTROL	
	NO.	%	NO.	%	NO.	%
Greater than usual	27	6.7%	21	5.9%	15	4.0%
Same as usual	294	72.8%	267	74.5%	289	80.0%
Less than usual	83	20.5%	71	19.6%	57	16.0%
TOTAL	404	100.0%	359	100.0%	361	100.0%

FIGURE 7 QUALITY OF SERVICE:
A SAMPLE RATING FORM USED BY WARD OBSERVERS

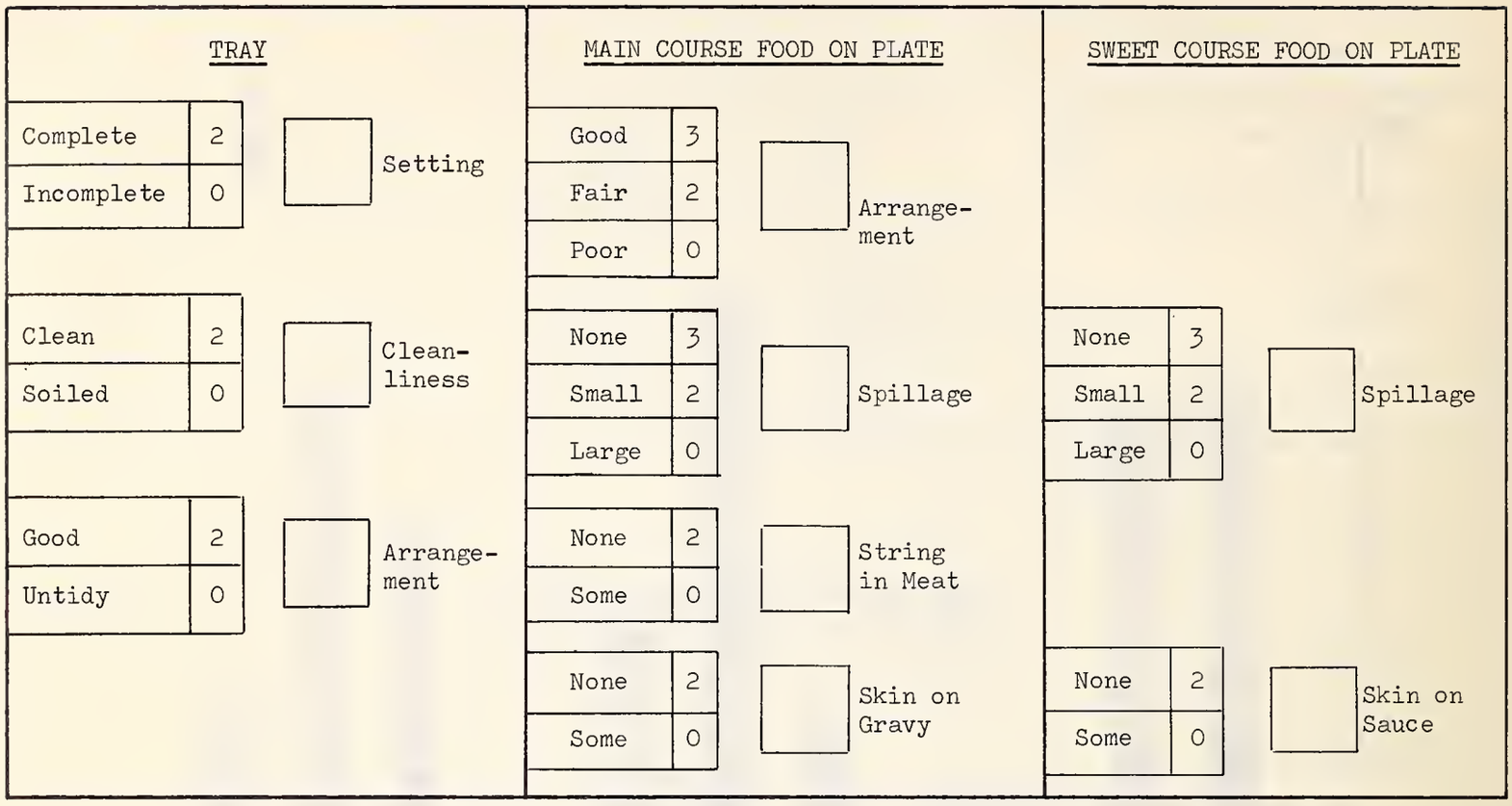


TABLE 4. QUALITY OF SERVICE : SCORES FOR GROUPED ITEMS

GROUPED ITEM	CENTRALISED			MENU & WARD			CONTROL		
	Possible Score	Rated	%	Possible Score	Rated	%	Possible Score	Rated	%
TRAY	60	54	90%	60	48	80%	60	52	87%
DINNER PLATE	69	59	86%	74	48	65%	68	57	84%
SWEET PLATE	31	22	71%	33	30	91%	33	24	73%

TABLE 5. QUALITY OF SERVICE: ORDER COMPLETENESS, APPEARANCE, AND FLAVOUR OF MEALS

		CENTRALISED		MENU & WARD		CONTROL	
		N	%	N	%	N	%
ORDER:	Complete	385	97.5%	352	96.3%	-	-
	Incomplete	10	2.5%	13	3.7%	-	-
APPEARANCE:	Good	313	78.7%	275	78.5%	277	76.5%
	Average	80	20.3%	73	20.4%	75	20.4%
	Poor	4	1.0%	3	1.1%	11	3.1%
FLAVOUR:	Good	301	76.4%	280	79.5%	258	70.5%
	Average	89	22.6%	73	20.5%	96	26.3%
	Poor	4	1.0%	0	-	12	3.2%

Figure 8

THE AVERAGE TRANSPORT AND WARD WAITING TIMES AND THE NUMBER OF TROLLEYS CONVEYED FOR EACH TYPE OF SERVICE

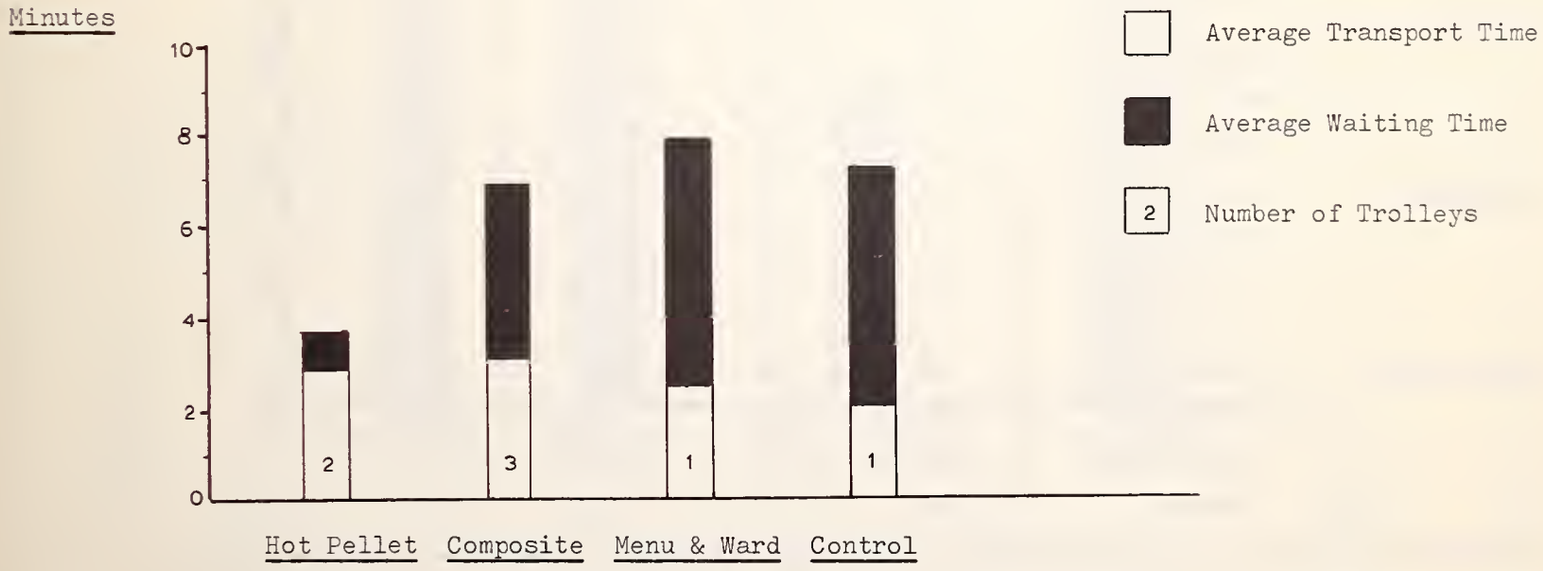


FIGURE 9. AVERAGE DURATION OF WARD SERVICE FROM FIRST TO LAST MEAL SERVED: ADJUSTED TO AVERAGE WARD OF 23.3 PATIENTS

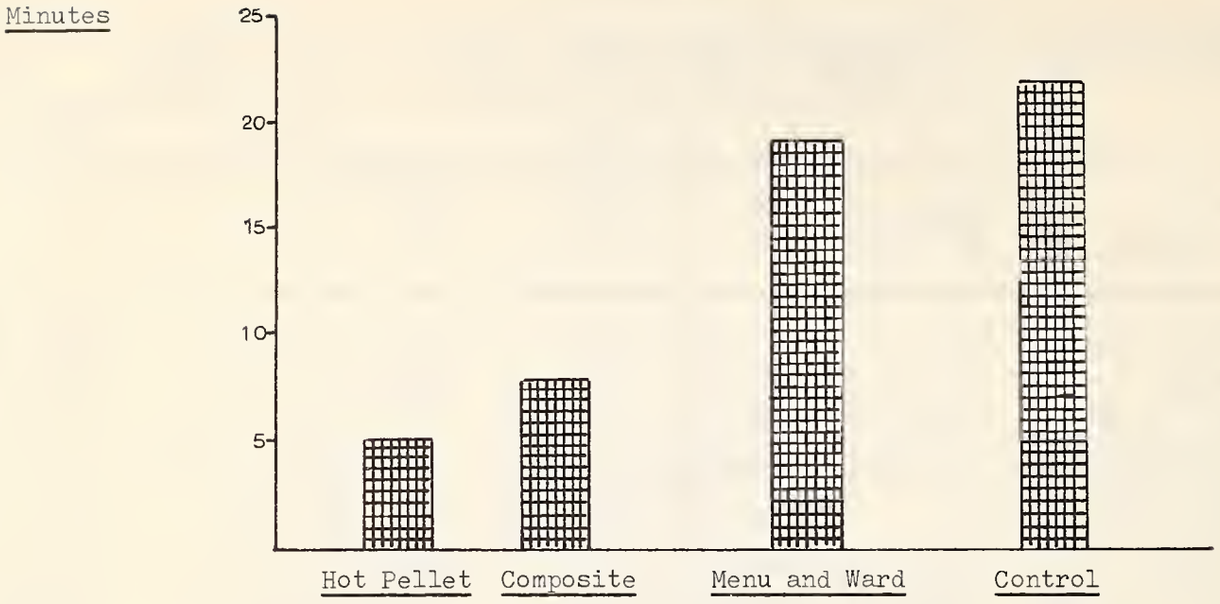


TABLE 6. FOOD TEMPERATURES: MEANS AND STANDARD DEVIATIONS
(All temperatures taken at the bedside)

ITEM	SERVICE	FIRST MEAL			LAST MEAL		
		N	M*	S.D.	N	M*	S.D.
MEAT	Hot Pellet	10	123	22.1	9	129	12.5
	Composite	10	118	24.2	10	119	12.1
	Menu & Ward	15	132	16.1	19	123	22.4
	Control	16	135	16.2	17	124	14.6
POTATO	Hot Pellet	10	118	21.7	9	127	10.8
	Composite	10	121	10.5	10	126	11.8
	Menu & Ward	16	140	17.6	20	129	19.5
	Control	20	145	13.0	20	132	14.9
VEGETABLE	Hot Pellet	8	130	10.2	8	133	11.5
	Composite	8	123	6.8	8	122	8.5
	Menu & Ward	16	133	12.1	18	118	9.9
	Control	16	140	13.0	17	123	11.4
ALL ITEMS	Ø(Hot Pellet	28	123	20.0	26	130	11.1
	(Composite	28	120	17.9	28	123	12.0
	Menu & Ward	47	135	16.9	57	124	19.1
	Control	52	140	15.1	54	126	14.3

* Means are calculated to the nearest whole °F. Where the true figure fell at 0.5 F. the means are given at the lower whole number.

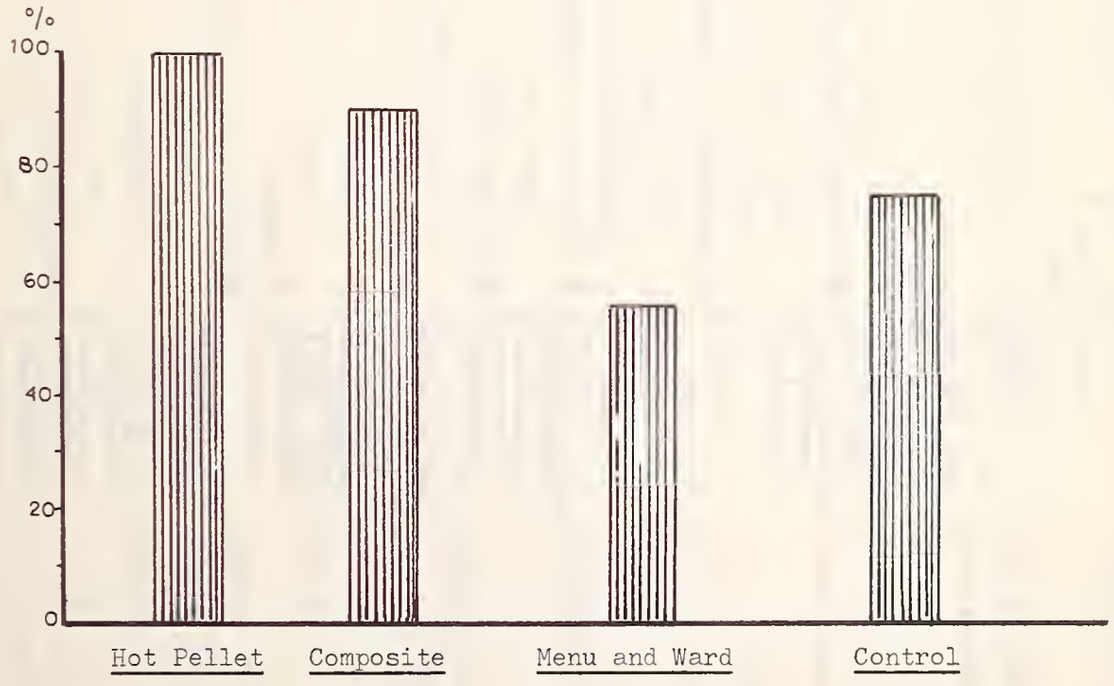
Ø t-test. First meal:- p: n.s. Last meal:- $p < 0.05$.

TABLE 7 - PERCENTAGE OF RESPONDENTS WHO RATED THE MEAL 'HOT ENOUGH' OR 'NOT HOT ENOUGH'

RESPONSE	HOT PELLET SERVICE	* COMPOSITE SERVICE	MENU & WARD SERVICE	CONTROL WARD
	N=202	N=180	N=399	N=355
Hot enough	85.0%	78.4%	89.5%	86.0%
Not hot enough	15.0%	21.6%	10.5%	14.0%

* t-test. $p < 0.05$

FIGURE 10. THE PERCENTAGE OF DINNER MEALS FREE FROM SPILLING



Bed / Ward | Diet

DINNER MENU
TUESDAY 4 JULY

NAME.....

Please black in (▨)

- MEAT OR FISH (Choose ONE)

	Small	Av'ge	Large
Roast Beef			
Shoulder Mutton in gravy			
Mince			

- SAUCE OR GARNISH

Gravy	

- POTATO (Choose ONE)

	Small	Av'ge	Large
Whole			
Mashed			

- VEGETABLE (Choose up to TWO)

	Small	Av'ge	Large
Cabbage			
Carrot Rings			
Pumpkin			

- SWEET (Choose up to TWO)

	Small	Av'ge	Large
Apple Sponge			
Custard Sauce			
Creamed Ground Rice			
Stewed Apple			
Jelly			
Vanilla Icecream			
Apple & Apricot puree			

Bed / Ward | Diet

TEA MENU
TUESDAY 4 JULY

NAME.....

the square to show the amount of

- SOUP

	Small	Av'ge	Large
Lentil Soup			

- SAVOURY (Choose ONE)

	Small	Av'ge	Large
Baked Crumbed Chops			
Chicken in Parsley Sauce			

- VEGETABLE OR SAUCE

Savoury Sauce	
Potatoes	

- DIABETIC & REDUCTION DIETS

	Small	Av'ge	Large
Chicken Chow Mein & Noodles			

- LOW FAT DIETS

	Small	Av'ge	Large
Chicken in Parsley Sauce			

- BREAD

	Small	Av'ge	Large
White			
Brown			

- CHEESE
- SPREAD (Choose up to TWO)

Butter	
Vegemite	
Jam	

- BEVERAGE

Tea	
Coffee	
Milk	

Bed / Ward | Diet / Checked

BREAKFAST MENU
WEDNESDAY 5 JULY

NAME.....

each food you choose.

- FRUIT

	Small	Av'ge	Large
Rhubarb			

- CEREAL

	Small	Av'ge	Large
Porridge			
Weetbix			

- COOKED DISH (Choose ONE)

	Small	Av'ge	Large
Grilled Lambs Fry & Bacon			
Poached Eggs			

- SAUCE
- BREAD

	Small	Av'ge	Large
White			
Brown			

- TOAST

	Small	Av'ge	Large
White			
Brown			

- SPREAD (Choose up to TWO)

Butter	
Honey	
Marmalade	
Vegemite	

- BEVERAGE

Tea	
Coffee	
Milk	

FIGURE 11. MENU SAMPLE - STUDY 2

MEAL SURVEY

BREAKFAST

Would you please help us by ticking (✓) the appropriate spaces below

I received all ☐ not all ☐ the menu items I ordered

	Fruit	Cereal	Cooked Dish
I received too much	☐	☐	☐
enough	☐	☐	☐
not enough	☐	☐	☐

	Bread/Toast	Spread
I received too much	☐	☐
enough	☐	☐
not enough	☐	☐

Before the meal my appetite was:-

greater than usual ☐
the same as usual ☐
less than usual ☐

Thank you for your help.

RESEARCH AND PLANNING UNIT
(DEPARTMENT OF HEALTH)

MEAL SURVEY

TEA

Would you please help us by ticking (✓) the appropriate spaces below

I received all ☐ not all ☐ the menu items I ordered

	Soup	Savoury	Veg/Sauce
I received too much	☐	☐	☐
enough	☐	☐	☐
not enough	☐	☐	☐

	Bread	Cheese	Spread
I received too much	☐	☐	☐
enough	☐	☐	☐
not enough	☐	☐	☐

Before the meal my appetite was:-

greater than usual ☐
the same as usual ☐
less than usual ☐

Thank you for your help.

RESEARCH AND PLANNING UNIT
(DEPARTMENT OF HEALTH)

MEAL SURVEY

DINNER

Would you please help us by ticking (✓) the appropriate spaces below

I received all ☐ not all ☐ the menu items I ordered

	Meat	Potato	Vegetable
I received too much	☐	☐	☐
enough	☐	☐	☐
not enough	☐	☐	☐

	Sweet
I received too much	☐
enough	☐
not enough	☐

Before the meal my appetite was:-

greater than usual ☐
the same as usual ☐
less than usual ☐

Thank you for your help.

RESEARCH AND PLANNING UNIT
(DEPARTMENT OF HEALTH)

FIGURE 12. QUESTIONNAIRE SAMPLE STUDY 2

The first question was omitted for control ward patients

FIGURE 13. SERVING GUIDE SAMPLE: STUDY 2
DINNER MEAL

ITEM	UTENSIL	SMALL	AVERAGE	LARGE
Roast beef	Tongs	1 slice	2 slices	3 slices
Steamed fish	Slice	1 small	1 medium	1 large
Mince	Spoon	½ spoon	1 spoon	1½ spoons
Potato, whole	Spoon	1 small	1 medium	1 large
mashed	Scoop	1 level	1 rounded	2 level
Cauliflower	Spoon	½ spoon	1 spoon	2 spoons
Swede, mashed	Spoon	½ spoon	1 spoon	2 spoons
Gravy	1 oz ladle	1 ladle	1 ladle	1 ladle
Sauce, white	1 oz ladle	1 ladle	1 ladle	1 ladle
SWEETS				
Rhubarb sponge 2" x 2" x 2"	Knife, slice	½ square	1 square	1½ squares
Sauce, vanilla	1 oz ladle	1 ladle	2 ladles	3 ladles
Semolina	4 oz ladle	1 ladle	2 ladles	3 ladles
Apricots	Spoon	1½ fruit	3 fruit	6 fruit
Jelly 2" x 2" x 2"	Knife, spoon	½ square	1 square	2 squares
Fruit Puree	Spoon	½ spoon	1 spoon	2 spoons
Ice Cream 12 slices/pkt	Knife, spoon or slice	½ slice	1 slice	1½ slices

Figure 14 PORTION GUIDE

ITEM	WEIGHT AND/OR MEASURE		
	SMALL	AVERAGE	LARGE
BREAKFAST			
Fruit	2 oz	4 oz	6 oz
Porridge	2 oz	4 oz	6 oz
Weetbix	1	2	4
Cooked. Bacon	¾ oz	1½ oz	2 oz
Spaghetti etc.	2 oz	4 ozs	6 ozs
Eggs	1	1	2
Fish steamed	2 oz	3 oz	4 oz
Lambs fry	2 oz	3 oz	4 oz
Meat/fish cakes	½	1	1½
Mince	2 oz	3 oz	4 oz
Sausages	1	1½	2
Bread (thin)	1 slice	2 slices	4 slices
Toast (thick)	1 slice	2 slices	3 slices
Spread. Butter	¼ oz	½ oz	1 oz
Honey/Marmalade	1 tsp.	2 tsp	3 or 4 tsp
Vegemite	½ tsp	½ tsp	1 tsp
DINNER			
Meat. Roast/fish/light	2 oz	3 oz	4 oz
Chops	1 small	1 medium	2 medium
Mince	1 oz	2 oz	3 oz
Stew/pie etc.	3 oz	4 oz	6 oz
Gravy/white sauce	1 oz	1 oz	1 oz
Mint sauce	½ oz	½ oz	½ oz
Potato whole/mashed	2 oz	3 oz	4 oz
Vegetable	1 oz	2 oz	4 oz
Sweets. Fruit, milk, baked steamed, pies and gelatin puddings	2 oz	4 oz	6 oz
Fruit puree	1 oz	2 oz	4 oz
Doughnuts	1½ oz	3 oz	5 oz
Jelly	1 oz	2 oz	4 oz
Sauces	1 oz	2 oz	3 oz
Ice-Cream 20 oz pkts	1/24th	1/12th	⅛th packet
TEA			
Soup	4 oz	6 oz	8 oz
Savoury Not specified elsewhere			
Egg scramble etc.	2 oz	3 oz	4 oz
Steak, grilled	2 oz	3 oz	4 oz
Shepherds pie	3 oz	4 oz	6 oz
Rice	2 oz	3 oz	4 oz
Tomato	½	1	2
Bread & spread as for breakfast			
Cheese	½ oz	¾ oz	1 oz

Figure 15

ANALYSIS OF THE AVERAGE AMOUNTS OF FOOD ISSUED PER PATIENT PER MEAL

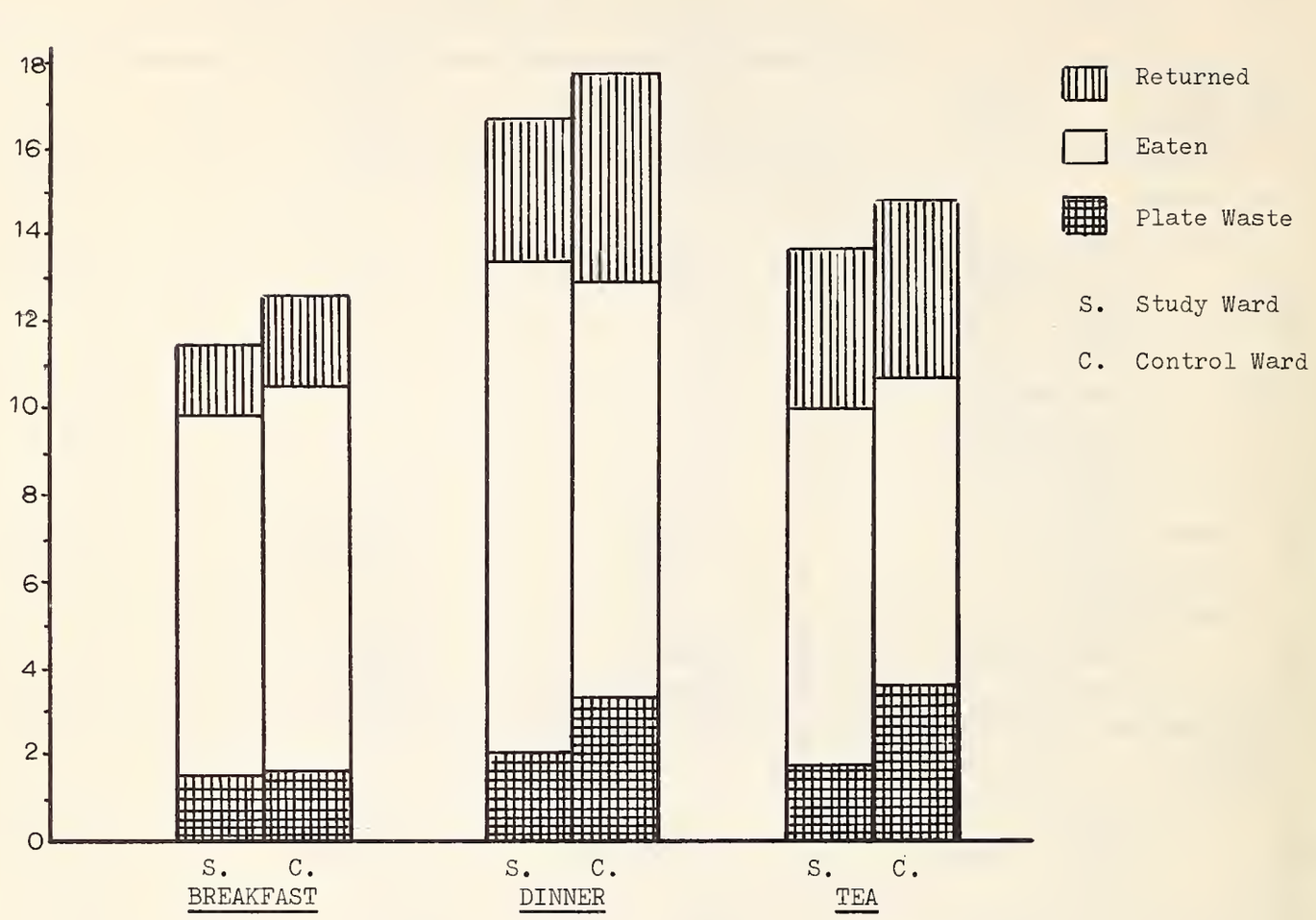


FIGURE 15. TABULATION AND SIGNIFICANCES (t-tests)

AMOUNT	BREAKFAST			DINNER			TEA		
	S.	C.	P.	S.	C.	P.	S.	C.	P.
Issued	11.35	12.55	0.05	16.68	17.89	n.s.	13.69	14.81	n.s.
Returned	1.54	2.21	n.s.	3.38	5.06	0.01	2.53	3.95	0.01
Eaten	8.28	8.76	n.s.	11.24	9.45	0.01	9.22	7.35	0.01
Plate Waste	1.49	1.58	n.s.	2.06	3.38	0.001	1.94	3.52	0.001

Figure 16

FOOD WASTAGE: THE AMOUNT OF FOOD COOKED BUT NOT EATEN SHOWN AS A PERCENTAGE OF THE AMOUNT EATEN

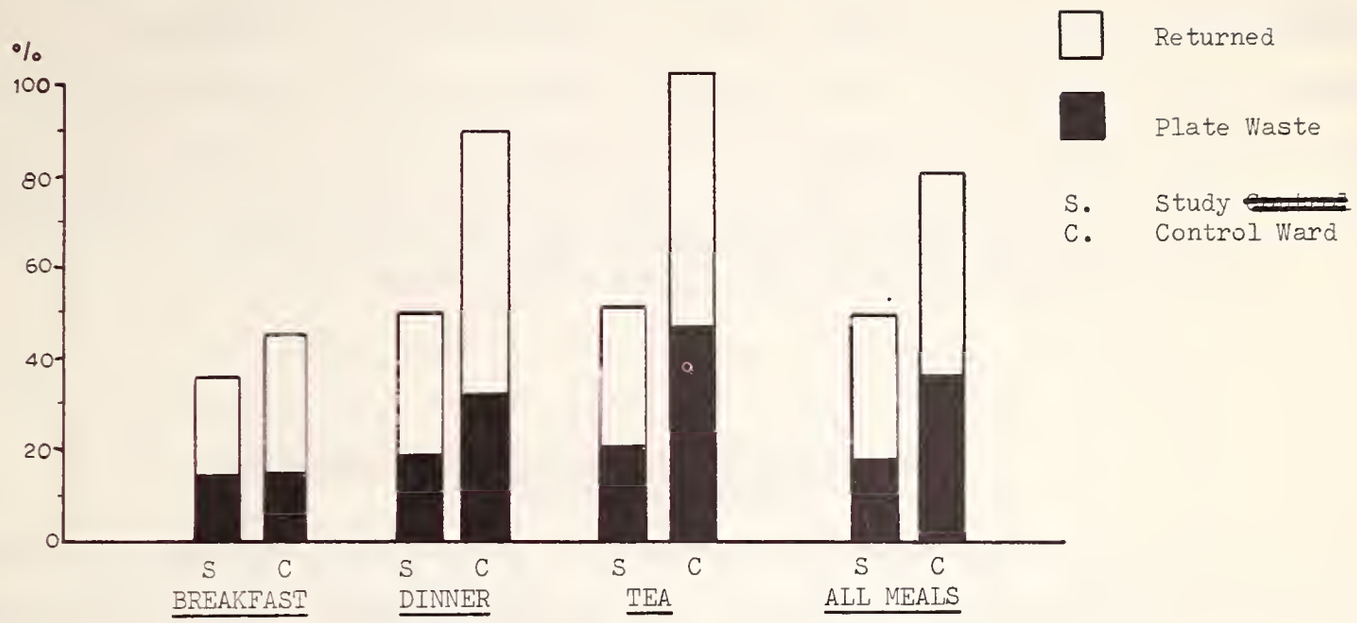


TABLE 8. SERVING ANALYSIS: TOTAL AMOUNTS

ITEM		ORDERED	ALLOWED	CALCULATED	SERVED
BREAKFAST	Fruit	634	75	709	650 ozs
	Cereal	1191	520	1711	2121
	Cooked	992	103	1095	1270
	Bread	820	89	909	872
DINNER	Meat	1514	394	1908	1562
	Potato	1466	201	1667	1499
	Vegetable	1670	479	2149	1870
	Sauce	305	190	495	388
	Sweet	2467	414	2881	3263
TEA	Soup	2398	676	3074	2594
	Savoury	1609	316	1925	2223
	Bread	649	68	717	663
	Cheese	117	7	124	118

TABLE 9. SERVING ANALYSIS: AMOUNTS PER PATIENT

MEAL	N	ORDERED	CALCULATED	SERVED	EATEN *
BREAKFAST	528	6.88 oz	8.38 oz	9.31 oz	7.84 oz
DINNER	660	11.25	13.79	13.00	10.96
TEA	483	9.88	12.09	11.59	9.65

* These numbers differ slightly from those in Figure 15 because they are based on raw data values instead of average amounts per day.

TABLE 10. THE NUMBER OF USED MENUS AND COMPLETED QUESTIONNAIRES RETURNED

WARD	NO. MEALS	NO. DAYS	MENUS RETURNED		QUEST'RES COMPLETED	
			NO.	%	NO.	%
STUDY	1980	15	1341	68%	693	35%
CONTROL	1878	14	-	-	649	34.5%

TABLE 11. THEORETICAL SAVINGS BASED ON THE RESULTS OF THIS STUDY

Control Ward:	Amount issued per patient per day	45.25 ozs
Study Ward:	Calculated issue per patient per day	34.26 ozs
	Difference	10.99 ozs
Difference (Savings) expressed as a percentage of Control Ward issue		24.3 %
Cost of 100 meals *		$21.80
Savings per 100 meals		$ 5.30
Savings per day for 1050 meals served		$55.62
	Annual Savings	$20,300:00

* For the hospital in which the study was carried out. (14)

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